

SPECIFICATION

1. Title of the invention:

IC wafer transporting container

2. Patent Claims:

(1) IC wafer transporting container having a bottom box and a lid in which a wafer-supporting member is attached, a wafer-top pressing-down body is attached to the back side of the said lid so that multiple round IC wafers are supported between the wafer-supporting member and the wafer top pressing-down body and in which the said IC wafer-supporting member is composed of an elastic plastic, a substantially flat connector is fixed detachably to the bottom side of the said bottom box, and a pair of wafer-supporting parts, the outer edge of which is bent upward, to be fixed detachably to the top of the side wall of the bottom box, and in which a series of projections with a V-groove for wafer engagement are formed on the top face of the wafer-supporting member, and an adjacent cut notch, independently flexible for each projection, are formed between the said projections.

(2) In the invention of Claim 1 for a container for IC wafer transportation, the said support member is notched to support each of the said projections in a cantilever manner.

(3) For the IC wafer-transporting container of the invention of Claim 1, the said projections are divided in two in the extension direction of the V-groove and are bendable in the valley formed in the middle of the projection.

(4) For the container of the inventions of Claims (1)-(3) for an IC wafer-transporting container, the said lid has a lengthwise groove at the center of its back face and the wafer-top pressing-down body is composed of an elastic plastic rectangular plate-like member.

(5) For the container of the invention of Claim 4, the said plate-like member of IC wafer-supporting member has multiple V-grooves opposite to the V-grooves of the support member, at its bottom.

(6) For the container of any one of Claims (1)-(3), the said lid has a lengthwise groove at the center of its back face and the wafer-top pressing-down body is composed of a plastic rectangular

attachment part that is pressed in the said groove and a pair of independent IC wafer-supporting parts, which extend in a forked manner, the tip of which is sharpened.

3. Detailed explanation of the invention:

This invention relates to a transporting container for IC [integrated circuit] wafers, such as silicon wafers, etc.

An IC wafer tends to break and become soiled absolutely before IC processing, so that strict attention is required for its transportation. Conventionally, many containers have been proposed. For example, typically, one has a support table with multiple walls provided to the container bottom, the wafers are placed on the wall, urethane foam is pressed on the wafers for packing in a bag, then a lid is put on and the bag is ripped from the lid top to expand the urethane foam for holding of the wafers. With this, container dust in the air, compressed in the urethane foam, contaminates the wafers as the urethane foam expands and the urethane foam only bears the load or shocks during transportation, therefore such container is not quite satisfactory.

This invention offers an IC wafer transporting container that is improved against contamination and damage to the wafers.

As shown in Figure 1, the container of this invention is composed of lid 1, bottom box 2, wafer-support member 3 attached to the inside face of bottom box 2, and wafer-top holder 4 attached to the back side of lid 1. Multiple wafers 5 (the Figure shows only 1 piece) are supported parallel between wafer-support member 3 and top holder 4. Lid 1 and bottom box 2 are made of transparent material so that the state of wafers stored inside can be observed from the outside.

Support member 3 is of flat, plate-like elastic plastic which is bent, as shown in Figure 2, and it is composed of connection part 6 that is fixed to the bottom face of bottom box 2 and support part 7 that supports wafer 5 by coming out of connection part 6. Fixing part 8 that is on the outside of the support part and notches for easy bending are formed at each boundary. A series of projections 9 are formed parallel on the top face of support part 7 and slot 10 is cut between the projections. V-groove 11 is formed on each projection, as shown in Figure 3.

In this practical example, projection 9 is separated into two parts 9', 9' at mid-valley 12, as shown in Figure 4, and it is made easy for downward bending. Support member 3 is preferably

made of an integrally formed polypropylene or soft polyethylene to prevent an adverse effect on the wafer. Support member 3 thus composed is fit into attachment rivet 14 and fixing part 8 is fit into groove 17, formed between projection 16 integral with 15 and the top end of side wall 15 of bottom box 2, so that support part 7 bends upward as a whole.

Wafer top holder 4 is a rectangular flat plate in this practical example and it is pressed onto groove 19, formed between two projections 18, 18 that extend lengthwise on the back face of lid 1 for fixing it therein. Wafer top holder 4 is preferably made of soft polyethylene. Step 20 is formed in projection 16, integrally formed on the outside of the side wall of bottom box 2, and when lid 1 is attached, its bottom contact with step 20 and stopper piece 21, integrally formed on the side wall of lid 1, and it is stopped by snapping in the cutout part in step 20 to achieve firm attachment of lid 1 onto bottom box 2.

In the above container, wafers 5 engage in V-groove 11 for supporting in projection 9 of the opposing support part, and when lid 1 is attached, they are suspended elastically by V-groove 11 by being held by top holder 4. At this time, projection 9 is pushed by wafer 5 and bends slightly downward, as shown in Figure 4. Projection 9 is separated from the adjacent one by slot 10 so that it can move independently and supports wafer 5 softly by its relatively weak elasticity. Therefore, a fairly large shock can be absorbed for protecting the wafer from damage.

In addition, wafer 5 is supported only at 3 places on its edge so the contamination of the wafer from contact is extremely small. Different size top holder 4 is used according to the size of the wafer, but, to a degree, the elastic support structure of this invention allows a different size wafer and top holder. Incidentally, valley 12, formed at the middle of projection 9, is formed to assist the soft elasticity and its size is to be determined according to its structure. It is preferable to make the polypropylene valley slightly large so that the valley bottom fits slightly into the rear face of the support member. Projection 9 can be formed in one mountain by omitting the valley entirely to produce the necessary flexibility of soft polyethylene is used.

Figure 5 shows another bottom box with a slightly different support part 7 of support member 3. It is used when projection 9 is formed in one mountain by the use of relatively hard elastic plastic material.

The support piece of projection 9, separated from the adjacent one, is made to support a projection in a cantilever manner because projection 9 is elastically displaced softly, when the wafer is stored in this practical example. Projection 9 itself cannot bend, as in the 1st practical example, but the edge of the wafer contacts V-groove 11 at one point so that the contact area is further reduced and it is more advantageous than the 1st practical example.

Top holder 4 is not limited to the flat plate used in the practical example and explained with Figures 1-4, and it can be varied. Figure 6 shows the one in which multiple V-grooves 21 are provided to the bottom edge of the soft polyethylene flat plate in a sawtooth-like manner and opposite to the V-groove of the support member 3. Similarly, Figure 7 shows the soft polyethylene one and it is composed of rectangular attachment part 22, fixed into groove 19 in lid 1 and a pair of rectangular wafer support parts 23 that extend in the above manner downward at an angle from the bottom edge of the said attachment part 22.

The tip of wafer support part 23 is sharpened and makes point contact with the edge of the wafer 5 when the wafer is held from the top. At such time, the angle formed by the two support parts 23 expands slightly and it is necessary to select the angle and length of the support part in advance, so that line contact with the wafer edge is prevented. The top holder in Figure 7 is more advantageous than that shown in Figures 1 and 7 because its elasticity is better.

The IC wafer-transporting container of this invention, explained above, having a projection with a V-groove, for engagement with the wafer, is separated from the adjacent one and can move separately so that the size difference in wafers can be absorbed, the elastic support of the wafer is soft and shock absorption is more superior to conventional ones, and damage to the wafer is greatly reduced. Point contact support of the wafer edge reduces contamination of the wafer. Furthermore, top holder 4 is removable from the container for easier cleaning. In addition, support member 3 is easily formed from the flat plate material by bending.

4. Brief explanation of the figures:

Figure 1 is a perspective of the IC wafer-transporting container of this invention. Figure 2 is a preassembly plan view of one practical example support member that is mounted in the container of Figure 1. Figure 3 is the cross-section of Figure 2 along g-g, Figure 4 is the cross-section of storing of the wafer in the container of Figure 1, Figure 5 is a perspective view of the other practical

example of the support member mounted in the container of Figure 1, Figures 6 and 7 are perspective views of the examples of a top holder attached to the lid of the container of Figure 1.

In the figures, 1 is the lid, 2 is a bottom box, 3 is a support member, 4 is top holder, 5 is the wafer, 6 is the connection part of the support member, 7 is the support part of the support member, 9 is a projection, 10 is a slot or notch, 11 is the V-groove, 12 is a valley, 19 is the groove in the lid, 21 is the V-groove in the top holder, 22 is the modification attachment part of the top holder, and 23 is the wafer support part of the same.